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**INTEROFFICE CORRESPONDENCE****FILE**

DATE July 2 1992

TO C B Gee Remediation Programs Bldg 080 X8550

FROM M C Burmeister Remediation Programs Bldg T891A X5891  
C D Cowdery Environmental Research and Technology Bldg 051 273-6036

SUBJECT OU 1 TREATMENT BUILDING PU EFFLUENT TEST RESULTS MBU-028-92

The following is a summary and explanation of the Pu 239 results on the effluent tank water collected at the 891 Treatment System. Results on testing performed by AEB Consultants Inc. showed Pu 239 levels of 1.03 and 0.801 pCi/L for effluent tanks 206 and 207 respectively (refer to attached sample analyses FT000381TU1 and FT000421TU1). The uncertainty reported is the relative percentage of the standard deviation (sigma) to the observed value in other words

$$/ \text{uncertainty} = \text{Sigma/Observed Activity} \times 100 /$$

The 2 sigma error is twice the standard deviation. It is not a percentage. A mistake was made in AEB's program that calculates 2 sigma from the percent uncertainty. The corrected 2 sigma values for Pu 239 are 0.1265 pCi/l and 0.0679 pCi/l for TK 206 and TK 207 respectively. Also note that although AEB's analysis only shows Pu 239, the analysis includes Pu 240 since both isotopes show up at the same energy.

As we discussed several days ago, the original values for Pu 239/240 (1.03 and 0.801 pCi/L for effluent tanks 206 and 207) obtained by AEB were suspect. Influent samples have never reflected Pu 239/240 values at these elevated levels. At our request, AEB analyzed the remaining sample volume. The second analysis found no traces of Pu 239/240.

TK 206 was sampled and analyzed by 881 Laboratory. The results are attached (Radiochemistry Report Isotopic Analysis by Alpha Spectrometry Lab # E92 1366 dated June 22 1992). 881 detected Pu 239/240 at 0.01 pCi/l, which is below the minimum detectable activity (MDA).

Based on the reanalysis by AEB and the results of 881 Lab's analysis, we can be reasonably certain that the values reported by the 881 Laboratory are more representative of the actual mean activity in the tanks. The discharge criteria for surface water standards is 0.05 pCi/l. TKS 206 and 207 meet the required discharge standard. It should be noted that the IRAP discharge standard for Pu 239/240 is 15 pCi/l.

JRC dmf

Attachment  
As Stated (3)

cc

J R Cirilo  
F D Hobbs

**ADMIN RECORD**

RADIOCHEMISTRY REPORT  
ISOTOPIC ANALYSIS BY ALPHA SPECTROMETRY

Lab Number E92-1366  
Report Date June 22 1992

Method summary

Depending upon the sample matrix, pretreatment of the sample (as determined by the responsible chemist) may be required to obtain an aqueous solution which is necessary to perform the isotopic separation chemistry. Plutonium (Pu-239,240), uranium (U-233,234, U-235 and U-238) and americium (Am-241) isotopes are separated from the prepared sample using ion-exchange and solvent extraction techniques, followed by electrodeposition onto counting planchets, and analyzed by alpha spectrometry. Each sample is spiked with a Chemistry Standards Laboratory (CSL) certified tracer of an isotope (Pu-242, U-232 or Cm-244) which behaves chemically identical to the analyte (Pu-239, U-234, -235, -238 or Am-241) and whose alpha energy can be isolated with no other alpha interferences. Procedure L-6235, "Isolation of Plutonium, Americium and Uranium From Aqueous Samples" is used to perform the isotopic separations.

The areas of the tracer and analyte peaks or regions of interest are ratioed and the analyte activity in disintegrations per minute (dpm) is solved from the proportion. All analyte and tracer peak areas in counts per minute (cpm) are corrected for the detector background cpm in the particular region of interest. In addition, since the standard tracers are not isotopically pure and may contain small quantities of the analyte, a preparation blank is required with each batch of samples for each analyte. The blank consists of the tracer aliquot only and from it the amount of interferant is quantitated. The sample's analyte activity in dpm is then corrected for the preparation blank and the result in pico-curies per liter or per gram (pCi/l or pCi/g) is calculated using the blank corrected dpm and the sample volume or weight analyzed.

Quality Control Summary

The samples are analyzed in batches where each batch consists of a maximum of 9 samples: a preparation blank, a CSL certified control and a laboratory duplicate (at least 10 percent of the samples are analyzed in duplicate). Again, each of these is spiked with a known quantity of standard tracer. The batch in which a sample was analyzed is denoted by the "Batch #" and all quality control samples are traceable to any particular sample by the QC batch number.

The MDA (minimum detectable activity) for this analytical method is dependent on the uncertainty of the preparation blank activity, detector efficiency, chemical recovery and volume or weight of sample analyzed. The chemical recovery represents the percentage of standard tracer that was recoverable through the sample preparation process.

The result uncertainty is calculated by propagation of the uncertainties due to counting statistics of the sample and of the preparation blank. The uncertainties are stated at the two sigma level.

**RADIOCHEMISTRY REPORT  
ISOTOPIC ANALYSIS BY ALPHA SPECTROMETRY**

**Lab Number E92-1366  
Report Date June 22, 1992**

**Significant Figures**

The results and uncertainties are reported in pCi/l or pCi/g as follows

<u>Sample Raw Result</u>	<u>Reported Sample Result and Uncertainty</u>
<1 0	nearest hundredth digit (0 01)
1 0 to 9 9	nearest tenth digit (0 1)
10 0 to 99 9	nearest 1's digit (whole number)
100 0 to 999 9	nearest 10's digit
1000 to 9999	nearest 100's digit

**Report Format Description**

The sample isotopic activities and uncertainties are reported in the "Isotopic Analysis Results" section of the report. The result uncertainty in pCi/l or pCi/g is designated as the "+/-" value and represents the uncertainty at the 2 sigma level. The letter "D" prefix indicates a field duplicate sample (a sample which is taken in duplicate while in the field). This differs from a laboratory duplicate which is a sample analyzed in duplicate.

The associated QA/QC results for the CSL controls analyzed in each respective batch number are reported in the "Quality Assurance/Quality Control Data" section of the report. The "Analysis Date" refers to the date the analysis was completed.

**Definition of Data Qualifiers**

There are no data qualifier symbols defined for Radiochemistry. All qualified data are explained in the narrative section of this report. Qualified results may be flagged with "\*\*" followed by an explanation.

**Exceptions or Deviations to Base Methods**

Depending upon the sample matrix and if there are solids or particulates present, deviations from procedure L-6235 may be required. These deviations are detailed in a procedure filed with the raw data.

RADIOCHEMISTRY REPORT  
ISOTOPIC ANALYSIS BY ALPHA SPECTROMETRY

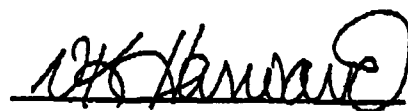
Lab Number E92-1366  
Report Date June 22, 1992

Narrative for E92-1366

The 891 tank sample was analyzed for americium, plutonium and uranium. The sample was analyzed in duplicate.

The first run of this sample batch resulted in poor recoveries due to technician error. The samples were rerun under scrupulous eyes. No problems existed and all QA/QC passed.

Chemist Approval



Date

6/22/92

N K Harward

RADIOCHEMISTRY REPORT  
ISOTOPIC ANALYSIS BY ALPHA SPECTROMETRY

Lab Number E92-1366  
Report Date June 22, 1992

Isotopic Analysis Results  
Sample Date 06/05/92

SAMPLE ID	QUANTITY (g)	DATE	SAMPLE ID	QUANTITY (g)	DATE
TANK 206	0.00 ± 0.02 (MDA 0.03)	ISO92-066	TANK 206	0.01 ± 0.02 (MDA 0.04)	ISO92-066
TANK 206D	0.00 ± 0.02 (MDA 0.03)	ISO92-066	TANK 206D	0.00 ± 0.02 (MDA 0.04)	ISO92-066

SAMPLE ID	QUANTITY (g)	DATE
TANK 206	0.00 ± 0.03 (MDA 0.06)	ISO92-066
TANK 206D	0.01 ± 0.03 (MDA 0.06)	ISO92-066

SAMPLE ID	QUANTITY (g)	DATE	SAMPLE ID	QUANTITY (g)	DATE
TANK 206	0.01 ± 0.03 (MDA 0.03)	ISO92-065	TANK 206	0.00 ± 0.03 (MDA 0.03)	ISO92-067
TANK 206D	0.01 ± 0.03 (MDA 0.03)	ISO92-065	TANK 206D	0.00 ± 0.03 (MDA 0.03)	ISO92-067

Quality Assurance/Quality Control Data

ANALYSIS		CEL CONTROL		CONTROL STANDARDS (d/m/mL)	
SAMPLE ID	DATE	CEL #	ISOTOPE	OBSERVED VALUE	STANDARD VALUE
ISO92-066	06/22/92	CEL # 640323	U-238	5.4 ± 0.8	4.9 ± 0.2
ISO92-066	06/22/92	CEL # 640323	U-234	4.8 ± 0.7	4.9 ± 0.2
ISO92-065	06/22/92	CEL # 670439	PU-239	5.4 ± 0.7	5.1 ± 0.2
ISO92-067	06/22/92	CEL # 670435	AM-241	4.7 ± 0.7	5.1 ± 0.2

ALC CONSULTANTS INC  
LABORATORY ANALYSIS REPORT  
REPORT DATE 06 16-1993

ALC SAMPLE NO 9201202  
BATCH NO 152  
MATRIX WATER  
SAMPLE COLLECTION DATE 05/29/92  
DELIVERY DATE 06/01/92

CLIENT SAMPLE NO F0000111701  
CONTRACT NO 152110593  
PROCESS TYPE WWS  
SAMPLE COLLECTION TIME 13 30  
ANALYSIS DUE DATE 06/15/92

TK-207

ANALYTE	DATE	WT	UNIT	AT	TIME	COUNTS	ACT	CONC	PERCENT	DT	NET	NAME	QUL	COUNT	TIME	INTER	2	SIGMA	PERCENT									
							pc/L																					
Am-243	06/12/92	1	6	L	AS	21	17	1271	0	0	3	3799	59	27	DISINTE	DEADS	MS	N/A	65 30									
Am-241	06/12/92	1	6	L	AS	21	17	3	63	0	00442	120	651	3	3799	6	392	DISINTE	DEADS	MS	14596-10	2	-0 0069					
Pu-242	06/12/92	1	6	L	AS	21	17	1671	0	0	12	3703	09	29	DISINTE	DEADS	MS	N/A	86 33									
Pu-239	06/12/92	1	6	L	AS	21	17	950	0	001	4	237	12	3703	07	42	DISINTE	DEADS	MS	10-12-8	37 8098	5						
Pu-238	06/12/92	1	6	L	AS	21	17	1	0	00063	100	037	12	3703	N/A	DISINTE	DEADS	MS	N/A	0 0017	0 0017							
Pu-236	06/12/92	1	6	L	AS	21	17	2	0	002	70	763	12	3703	N/A	DISINTE	DEADS	MS	N/A	0 0057	0 0057							
U-232	06/12/92	1	6	L	AS	21	17	500	0	0	6	4025	79	26	DISINTE	DEADS	MS	N/A	20 16	1 6732	0 4940	0 4154						
U-234	06/12/92	1	6	L	AS	21	17	59	0	118	14	105	6	4025	N/A	DISINTE	DEADS	MS	11-00-5	30 60 days	400	30 60 days	1	10-9	10-79-7			
U-235	06/12/92	1	6	L	AS	21	17	21	0	055	22	230	6	4025	N/A	DISINTE	DEADS	MS	15117-96	1	1	0 60	N/A	DISINTE	DEADS	MS	10020-17-9	
U-238	06/12/92	1	6	L	AS	21	17	24	0	045	21	665	6	4025	N/A	DISINTE	DEADS	MS	7440-60-1	1	1	0 851	N/A	DISINTE	DEADS	MS	11 10-9	
Th-232	06/06/92	10	ML	LS	17	36	0	60	74	775	0	1	0	60	N/A	DISINTE	DEADS	MS	10020-17-9	1	1	0 851	N/A	DISINTE	DEADS	MS	11 10-9	
Th-230	06/12/92	1	0	L	LS	17	19	5	30	9	410	0	1	0	851	N/A	DISINTE	DEADS	MS	11 10-9	1	1	0 851	N/A	DISINTE	DEADS	MS	11 10-9
Cal-45	06/14/92	1	0	L	LS	19	29	0	0	0	1	1	1	1	N/A	DISINTE	DEADS	MS	10-79-7	2	20 60 days	2						

CHECKED BY W. Anderson DATE 6/16/92  
APPROVED BY [Signature] DATE 6/16/92

ALB CONSULTANTS INC  
 RADIOCHEMICAL SAMPLE ANALYSIS REPORT  
 REPORT DATE: 06-16-1992

ANALYSIS VOL/FLASK	ANALYT CPM OR	QSS	PERCENT DT	DET	BLANK	RID	CAS NUMBER	QUAL	COUNT RATE	TIME	20	60 days	4	PERCENT	YIELD
ANALYTIC DATE	WT	UNIT AT TIME	COUNTS	ACT	PC/L	PERCENT	NO	DT	FROM SAMPLE	PINEL	NUMBER	CODE	DISINTEGRATIONS	TRG	10 01 1
06/16/92	1.0 L	15 19 29	1 262 0	0	1	90	N/A	N/A	DISINTEGRATIONS	TRG	10 01 1	1	1	1	1

CASE NARRATIVE  
 Uranium analysis will be rerun due to low chemical recovery of yield tracer

CHECKED BY	W. Anderson	DATE	6/16/92
APPROVED BY	<i>[Signature]</i>	DATE	6/16/92



AND CONSULTANTS INC.  
RADIOCHEMIST SAMPLE ANALYSIS REPORT  
REPORT DATE: 06 16 1992

LAB SAMPLE NO 920803

BATCH NO 153

SAMPLE WATER

SAMPLE COLLECTION DATE 06/04/92

DELIVERY DATE 06/05/92

CLIENT SAMPLE NO 170000121001

CONTRACT NO A521106591

PROCESS TYPE HIGH

SAMPLE COLLECTION TIME 13 37

ANALYSIS DUE DATE 06/15/92

TK-206

ANALYSIS VOL/ MASS	ANALYSIS CTR OR	ORG	PERCENT OF DRY	NAME	UNIT	FROM	ANALYSIS	RID	CAS NUMBER	QUAL	COUNT RATE	INJECTION	2 SIGMA	PERCENT
ANALYSIS DATE	BY	UNIT	AT TIME	COUNTS	ACT	PC/L	ANALYSIS	DATE	TIME	DATE	TIME	DATE	TIME	DATE
AN-243	06/12/92	1	6	L	AS	21:17	746	0	0	4	4060	77	21	151717-96
AN-241	06/12/92	1	6	L	AS	21:17	4	24	0	0029	60	940	4	4060
AN-242	06/12/92	1	6	L	AS	21:17	669	0	0	13	3437	67	65	151717-96
AN-239	06/12/92	1	6	L	AS	21:17	492	1	036	6	107	13	3837	57
AN-238	06/12/92	1	6	L	AS	21:17	3	0	006	74	645	13	3837	N/A
AN-236	06/12/92	1	6	L	AS	21:17	3	0	007	74	645	13	3837	N/A
AN-232	06/12/92	1	6	L	AS	21:17	172	0	0	7	3695	N/A	151717-96	9
AN-234	06/12/92	1	6	L	AS	21:17	53	0	039	16	262	7	3695	11-04-5
AN-235	06/12/92	1	6	L	AS	21:17	20	0	170	23	697	7	3695	151717-96
AN-238	06/12/92	1	6	L	AS	21:17	18	0	115	26	054	7	3695	7440-60-1
AN-3	06/15/92	10	ML	LS	10	00	2	01	279	20	0	1	79	N/A
AN-20	06/12/92	1	0	L	LS	17	19	0	19	730	0	1	79	N/A
AN-20	06/14/92	1	0	L	LS	19	20	0	0	1	90	N/A	151717-96	2

CHECKED BY

DATE

6/16/92

APPROVED BY

DATE

6/16/92

AED CONSULTANTS INC.  
 RADIOCHEMICAL SAMPLE ANALYSIS REPORT  
 REPORT DATE: 06-16-1992

ANALYSIS NO./MISS	ANALYSIS CPM OR	CBS	PERCENT DT	DET	BLANK	RED	CBS NUMBER	QUAL	COUNT RATE	DETECTION	2 SIGMA	PERCENT
ANALYSIS DATE	BY UNIT AT FIVE	COUNTS	INCENT	NO	REF	FROM SAMPLE	PANEL	NUMBER	CODE	TIME	YIELD	YIELD
DATA 06/14/92	10 L	LS 19 28 0 676 0	0	1	90	N/A	ALISIA	INDUS	FIG 10-11	1	20	60 days

Uranium analysis will be return due to low chemical  
 recovery of yield tracer

CASE NARRATIVE

COLLECTED BY <i>W A Anderson</i>	DATE 6/16/92
PREPARED BY <i>W A Anderson</i>	DATE 6/16/92

